Introduction

Within the space of a few months, COVID-19 has had an unprecedented effect on our healthcare systems internationally. Elective endoscopy within the UK had all but stopped as a result of challenges faced early on in the pandemic [1]. We now face the challenge of recovering endoscopy services, and it is almost certain that working practices will change for the foreseeable future.

Guidance from the British Society of Gastroenterology (BSG) describes strategies for recovery, including the development of “COVID-minimized” endoscopy units [2, 3]. This is further supported by guidance from the Joint Advisory Group on Gastrointestinal Endoscopy (JAG) and the European Society of Gastroin-
Intestinal Endoscopy (ESGE) [4, 5]. As a result, key changes to practice are being undertaken, including patient screening, room management, and use of personal protective equipment (PPE). However, COVID-19 also presents challenges to our workforce, who will have to adapt to novel environments and practices. Endoscopy teams will also be re-forming after periods of redeployment, potentially anxious about the conceivable ongoing personal risk to themselves and their families.

Effective teamworking is crucial to team performance and, ultimately, to patient outcomes [6]. Adaptations to practice are evolving rapidly as new guidance is released or updated. Teams need to be supported in developing flexibility and the additional situational demand that results. This article outlines practical steps to enhance teamworking in endoscopy during COVID-19 through the use of a novel toolkit.

**Methods**

**Developing the Endoscopy Team Toolkit**

Healthcare systems can be defined by a human factors model of inputs, processes, and outcomes [7]. Understanding how this model is influenced by the pandemic allows us to design and implement appropriate interventions to improve patient and organizational outcomes. Endoscopic nontechnical skills (ENTS) include the communication, teamwork, leadership, situational awareness, and judgment fundamental to performing endoscopic procedures [8] and should be considered during the design process. A human factors model for endoscopy during COVID-19 was therefore developed (Fig. 1), which informed a set of key goals for endoscopy teams, as presented below.

1. Planning and anticipating problems
2. Optimizing communication
3. Fostering a sense of team cohesion
4. Flattening hierarchy
5. Sharing task burden
6. Providing support and wellbeing where needed.

The goals listed informed the design and development of a toolkit to support endoscopy teams, complementing the current BSG, JAG, and ESGE guidance for endoscopy services [2–5]. The toolkit consists of four user-friendly cognitive aids that operationalize teamworking processes, supporting a system of team briefing and debriefing. Input from experts in human factors (including the Clinical Human Factors Group [9]), nontechnical skills, and patient safety was incorporated, supported by nursing and clinical oversight. This intervention was designed and implemented promptly in response to clinical need, and refinements were made following a 6-week period of testing and user feedback at a tertiary endoscopy unit. A handbook of the toolkit aids, including descriptors, can be found in the online supplementary material. We describe the toolkit in more detail in the sections that follow.

**Fig. 1** Input, process, and output model of factors influencing endoscopy team performance following COVID-19.
Results

Pre-endoscopy huddle and briefing

The terms “huddle” and “briefing” are often used synonymously to describe a meeting of team members before a task is performed; such meetings have been demonstrated to improve safety-related outcomes and team performance measures [10, 11]. Although these processes may already be embedded within endoscopy units, they should be adapted to the current situation in order to optimize teamworking and preserve patient safety.

Briefings familiarize team members with each other, allow task planning, and enhance communication. They can improve the quality of information sharing, promote accountability, empower team members, and provide a sense of team cohesion [12]. From a human factors perspective, briefings can be invaluable in flattening hierarchy – reducing the authority gradient between “senior” and “junior” staff by encouraging contributions from all multidisciplinary team members, thus improving safety. Aligning team goals, checking shared understanding, and providing the opportunity to share concerns are important in optimizing teamworking. For the purpose of the toolkit, we use the term “huddle” to describe a whole team huddle at the start of the day and “briefing” for the smaller team briefing prior to case and/or list.

Fig. 2 Endoscopy team toolkit: whole team huddle aid [A]; list team briefing [B]; list team debrief aid [C].
Whole team huddle
The whole team huddle describes a daily briefing with all endoscopy staff, including endoscopists, nurses, healthcare assistants, decontamination staff, and porters ([Fig. 2a]; further detail in the supplementary material). This is an opportunity to touch base with all staff members and to foster a positive teamwork culture.

List team briefing
For the core team running an endoscopy list (endoscopist, assistants, room runner), a more dedicated briefing is required, known as the “list team briefing” ([Fig. 2b]; further detail in the supplementary material). This builds on the principles of the whole team huddle with more specific, case-centered communication. The briefing should precede and complement the endoscopy safety checklist and is not a replacement for it. This is an opportunity to enhance the team-building process, encourage open contribution, flatten hierarchy, and develop a shared understanding [12].

Team debrief
Debriefing allows the team to collate, process, and act on information derived from a patient encounter to influence future behaviors and team performance. This process also strengthens team bonds by promoting interaction between members [13]. Ideally, all team members should be encouraged to contribute to the debrief in open discussion. The debrief aid provides a framework for these discussions ([Fig. 2c]). Debriefs should be led by a team member following a basic model of “description, analysis, and application” [14]. Team members describe what happened, consider the reasoning behind this, and offer solutions if needed. “Active” listening should be encouraged, enabling all team members to contribute and improving the effectiveness of idea generation. The COVID-19 pandemic has almost certainly amplified previous stressors and created new concerns in our workforce, and the debrief is a good opportunity to signpost wellbeing resources. Elements of the list team debrief are described in detail in the supplementary material.

Optimizing ENTS in PPE
A significant change to practice is the use of PPE during endoscopic procedures. At the time of writing, the choice of PPE (standard or enhanced) is governed by procedural type and patient risk stratification, including COVID-19 screening [2]. PPE may affect elements of procedural delivery, most notably ENTS. Both verbal and nonverbal communication may be impaired through use of respirator masks and head coverings [15]. These challenges should be anticipated prior to each case and highlighted in the team briefing as described previously. Team members should consider the following points to optimize communication ([Fig. 3]; further detail in the supplementary material):
- key cues
- directed communication
- closed-loop communication
- repetition.

### Endoscopy Non-Technical Skills (ENTS) in PPE

#### Tips to optimise ENTS in PPE (for in-room team and dedicated runner)

**Display your name on outer gown**

**Directed communication**
- Sender directs information to intended team member(s) by name
- Speak louder than you normally would
- Focused attention from the person receiving
- Eye contact between sender and receiver

**Repetition**
- Key pieces of information need to be repeated back to team
- Use different phrases to repeat information to optimise delivery

**Patient communication**
- Agree short, directed verbal and non-verbal cues with patient before procedure:
  - FROM patient: pain, pause or stop
  - TO patient: instructions or manoeuvres

**Shared awareness**
- Promote confidence to speak up (flatten hierarchy)
- Remain vigilant and communicate if loss of situational awareness recognised in others or team

**Closed-loop communication**
- The sender conveys a message, the receiver acknowledges this verbally with sender
- Sender acknowledges message correctly understood

**Directed communication**
- Sender directs information to intended team member(s) by name
- Speak louder than you normally would
- Focused attention from the person receiving
- Eye contact between sender and receiver

**Repetition**
- Key pieces of information need to be repeated back to team
- Use different phrases to repeat information to optimise delivery

**Patient communication**
- Agree short, directed verbal and non-verbal cues with patient before procedure:
  - FROM patient: pain, pause or stop
  - TO patient: instructions or manoeuvres

**Key cues**
- Agree verbal/non-verbal cues that summarise intentions with clear meaning before procedure
- Verbal cues = key words/phrases
- Non-verbal cues = hand gestures

**Directed communication**
- Sender directs information to intended team member(s) by name
- Speak louder than you normally would
- Focused attention from the person receiving
- Eye contact between sender and receiver

**Repetition**
- Key pieces of information need to be repeated back to team
- Use different phrases to repeat information to optimise delivery

**Patient communication**
- Agree short, directed verbal and non-verbal cues with patient before procedure:
  - FROM patient: pain, pause or stop
  - TO patient: instructions or manoeuvres

**Shared awareness**
- Promote confidence to speak up (flatten hierarchy)
- Remain vigilant and communicate if loss of situational awareness recognised in others or team

**Closed-loop communication**
- The sender conveys a message, the receiver acknowledges this verbally with sender
- Sender acknowledges message correctly understood

**Display your name on outer gown**

**Directed communication**
- Sender directs information to intended team member(s) by name
- Speak louder than you normally would
- Focused attention from the person receiving
- Eye contact between sender and receiver

**Repetition**
- Key pieces of information need to be repeated back to team
- Use different phrases to repeat information to optimise delivery

**Patient communication**
- Agree short, directed verbal and non-verbal cues with patient before procedure:
  - FROM patient: pain, pause or stop
  - TO patient: instructions or manoeuvres

**Key cues**
- Agree verbal/non-verbal cues that summarise intentions with clear meaning before procedure
- Verbal cues = key words/phrases
- Non-verbal cues = hand gestures

**Directed communication**
- Sender directs information to intended team member(s) by name
- Speak louder than you normally would
- Focused attention from the person receiving
- Eye contact between sender and receiver

**Repetition**
- Key pieces of information need to be repeated back to team
- Use different phrases to repeat information to optimise delivery

**Patient communication**
- Agree short, directed verbal and non-verbal cues with patient before procedure:
  - FROM patient: pain, pause or stop
  - TO patient: instructions or manoeuvres

---

**Fig. 3** Endoscopy team toolkit aid for optimizing endoscopic nontechnical skills (ENTS) in personal protective equipment (PPE).
PPE may also impair effective patient communication, which may be exacerbated by language difficulties, auditory or visually impairment. Short, directed cues should be agreed with the patient in advance to convey issues such as pain or to pause or stop a procedure. Equally, instructions and procedural progress should be succinctly verbalized or gestured by team members to the patient. Situational awareness, and the ability to perceive, comprehend, and anticipate events, may also be compromised when PPE is in use. Team members should remember to remain vigilant at all times and be encouraged to speak up if they recognize a loss of situational awareness in other team members.

**Discussion**

The initial implementation of briefings and debriefings may be perceived as “added work” owing to the change to workflow needed to accommodate them [11]. Leadership from medical, nursing, and management teams is required to embed these changes from the outset. Benefits will be seen if staff are engaged in the process early on, recognizing that their involvement is valued with ongoing modifications tailored to their working needs. The toolkit may be used initially in a “checklist-style” fashion, but as endoscopy teams become more familiar with the process, it can become more of an aide memoire. Some elements may appear repetitive; however, these processes can be adapted to suit local needs, and need not be exhaustively adhered to. Cognitive aids can be tailored further, followed by periods of testing and implementation.

To maintain consistency, a standardized time and location for the whole team huddle should be defined. It is important to set a time limit in order to focus discussion and minimize perceived disruptions to workflow. To promote engagement, the huddle lead can be rotated among medical and nursing staff. Huddles should adhere to social distancing principles and be supported by video conferencing if it is difficult to accommodate all staff members in a single space. Huddle discussions should be visually represented within a confidential area in the department, for example a whiteboard in staff areas, to provide a brief description of outcomes and engage staff members who cannot attend. Case briefs and debriefs should be short and succinct to facilitate workflow, whereas more time should be allocated for list debriefs to focus on team and procedural outcomes.

**Conclusions**

Endoscopy teams will continue to adapt to changes in practice precipitated by the COVID-19 pandemic. A toolkit of cognitive aids, based on human factors principles, may be useful in supporting this adjustment and will be helpful in the long term.

**Acknowledgments**

We would like to acknowledge the support of the Clinical Human Factors Group, particularly Jo Simmons and John Pickles, who helped to refine the toolkit aids.

---

**Competing interests**

The authors declare that they have no conflicts of interest.

**References**


